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TWO NEW COTTID FISHES FROM THE WESTERN PACIFIC, WITH A REVISION OF THE GENUS STLENGIS JORDAN AND STARKS

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The extensive collections made by the United States Bureau of Fisheries steamer *Albatross* in the northwestern Pacific during the cruise of 1906 contain several new species of cottid fishes, two of which are herein described. The drawings for the plate were made by the late William Sackston Atkinson under the direction of the late Dr. Charles Henry Gilbert. The text figures of scales were drawn by me. I am greatly indebted to Dr. George S. Myers, of the United States National Museum, for detailed information concerning the type and only known specimen of *Stlengis osensis*.

In their review of the Cottidae of Japan, Jordan and Starks [1] described two rather closely related species under the names *Stlengis osensis* and *Schmidtia misakia*. The two new genera to which these fishes were allocated were distinguished from each other by the character of the squamation alone, there being three longitudinal scale bands in *Stlengis* and one in *Schmidtia*. *Stlengis distoechus*, the new species described below, is an intermediate form having two bands of scales.

While the three fishes show marked differences in squamation, the strong tendency to reduce and modify scales, which is expressed by

[1] Proc. U. S. Nat. Mus., vol. 27, pp. 231-335, 43 figs., 1904.

the bewildering variation in this regard throughout the entire family, lessens the apparent evolutionary significance of changes in these structures. *Stlengis osensis*, with its three bands of scales, approximates most closely the hypothetical, completely scaled, ancestral type. The differences that have occurred in the squamation of the other two species have been loss variations of a type that may occur readily and are of comparatively minor importance. Indeed, in the course of extensive studies on the Cottidae, I have found several instances where such loss variations result in striking reductions of scaled areas with the increase in age of the individual. *Orthonopias triacis* Starks and Mann and *Clinocottus analis* (Girard) present excellent examples.

In spite of the marked differences in squamation, the many similarities of the three species point to their rather close relationship and indicate that they form a circumscribed evolutionary line comparable in all respects to such genera as *Icelus*, *Myoxocephalus*, and *Gymnocanthus*. It seems advisable, therefore, to group these three fishes together in the single genus *Stlengis*.

Genus STLENGIS Jordan and Starks

Stlengis Jordan and Starks, Proc. U. S. Nat. Mus., vol. 27, p. 236, 1904.
Schmidtia Jordan and Starks, *ibid.*, p. 237.
Schmidtina Jordan and Starks, *ibid.*, p. 961.

Genotype.—*Stlengis osensis* Jordan and Starks.

Diagnosis.—Dorsal and ventral body profiles forming almost straight lines from anterior end of first dorsal (deepest point of body) to caudal peduncle but bulging slightly under each of the median fins.

Head markedly depressed, its width at base of upper preopercular spines much greater than depth at same point. Jaws about equal; maxillary extending to or slightly beyond middle of pupil, its posterior width exceeding that of narrow suborbitals. Anterior nostrils in short tubes; posterior nostrils with borders little if any elevated, difficult to distinguish from mucous pores. Orbit large, its diameter greater than length of snout. Interorbital space flat or slightly convex; top of head gently concave, with a pair of low, rounded, parieto-extrascapular elevations at the posterior border of the shallow depression. Nasal spines sharp, slightly curved, their length equal to a little more than 0.5 posterior width of maxillary. Preopercle armed with 4 spines, the upper one long, extending to or very slightly beyond subopercular margin, with a simple or bifid tip and 3 to 5 recurved barbs along its upper margin; lower preopercular spines simple, about as long as barbs of antlerlike spine; the upper one of these simple spines directed backward, the middle one backward and downward, the lower one downward and forward. A minute spinous point at lower angle of subopercle and another at posterior

angle of interopercle; these spines frequently difficult to see but readily located by touch in alcoholic specimens. No other spines on head. Pores of head well developed; those on suborbitals divided into two almost equally prominent series bordering the suborbital chain dorsally and ventrally; anterior pore of the mandibular series unpaired, opening on the median ventral surface of the symphysis. Gill membranes broadly united, free from isthmus. Branchiostegals 6. Teeth in moderately broad, villiform bands on premaxillaries, dentaries, vomer, and palatines. No slit behind the last gill. Gill rakers in the form of short tubercles.

Origin of first dorsal directly over or very slightly behind dorsal end of gill opening; first two spines with approximate bases. Second dorsal separated from first by a narrow but definite interspace. Origin of anal under first, second, or third dorsal ray. Pectorals extending to perpendicular from first or second anal ray. Pelvic base very slightly behind lower end of pectoral base; fin of 1 spine and 2 rays, the inner one the longer. Caudal slightly rounded. Anus in front of anal origin at a distance about equal to diameter of pupil, located just anterior to a very small, bluntly conical, genital papilla. Sides of body with 1, 2, or 3 longitudinal bands of large ctenoid scales, each band only one scale in width. No cirri present.

Remarks.—It is difficult to estimate the exact degree of relationship of the three fishes comprising this genus. However, the fact that *Stlengis misakia* has progressed farthest in the reduction of scales, and that in this species the pores of the lateral line system on the head have remained small and those of the mandibular series become encircled by small supernumerary openings, while in the other two species they have become markedly enlarged and remained simple, indicates that *S. misakia* is the most isolated form. While this species was probably the first to split from the ancestral stock, the pronounced differences occurring in the other two species suggest that they were derived from a branching of the primitive line soon after the splitting off of *S. misakia.*

The preopercular armature, the ventral fins, and the structure of the scales indicate that this genus is most closely related to *Icelinus* Jordan, of the western coast of North America.

KEY TO THE KNOWN SPECIES OF THE GENUS STLENGIS

a[1]. Sides of body armed with a single band of scales; main pores of mandibular series surrounded by small supernumerary openings ..... **misakia**

a[2]. Sides of body armed with 2 or 3 bands of scales; pores of mandibular series simple.

b[1]. Sides of body with 2 bands of scales; anal fin with 10 or 11 rays ..... **distoechus**

b[2]. Sides of body with 3 bands of scales; anal fin with 14 rays ..... **osensis**

STLENGIS OSENSIS Jordan and Starks

Stlengis osensis JORDAN and STARKS, Proc. U. S. Nat. Mus., vol. 27, p. 236, fig. 1, 1904; Bull. U. S. Fish Comm., vol. 22, p. 590, fig., 1902 (1904).—JORDAN, TANAKA, and SNYDER, Journ. Coll. Sci. Imp. Univ. Tokyo, vol. 33, p. 255, fig. 189, 1913.

Diagnosis.—Orbit 3.0 in head. Pores of head large and prominent, those of mandibular series simple. Dorsal VIII, 15; anal 14; pectorals 20. Sides of body with 3 longitudinal bands of strongly ctenoid scales; the dorsal band extends from level of sixth dorsal spine to caudal base and contains 27 scales; the middle band, following the lateral line, extends to just beyond end of second dorsal and contains 27 scales; the ventral band extends from just anterior to anal origin to caudal base and contains 24 to 25 scales.

Unfortunately the values given in the type description for the fin ray and scale counts are in error. The figure is correct with regard to these structures.

STLENGIS DISTOECHUS,[2] new species

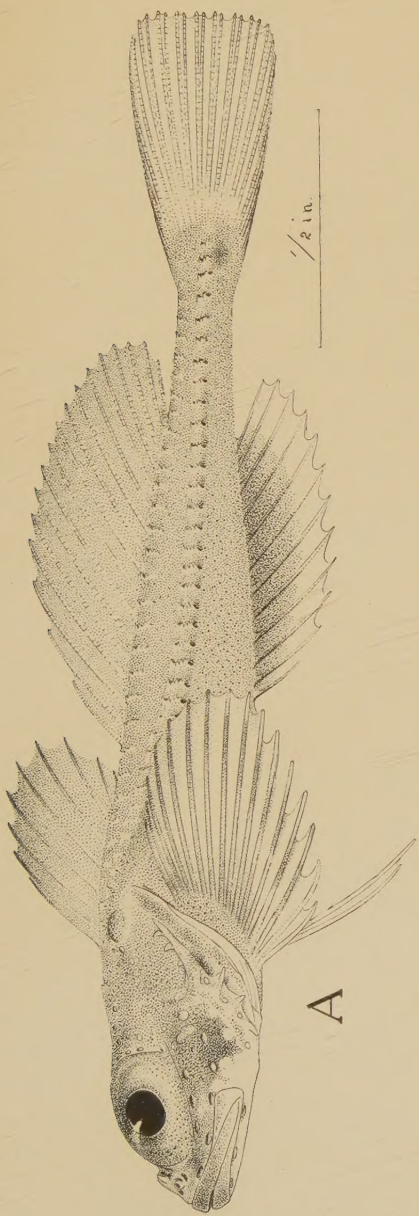
FIGURE 26; PLATE 34, A

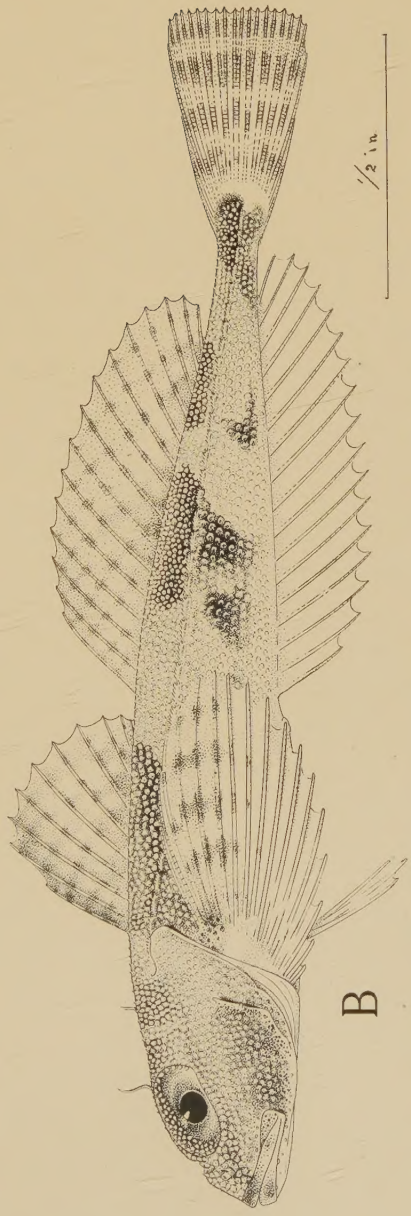
Diagnosis.—Orbit 2.6 (2.5–2.6) in head. Pores of head large and prominent, those of mandibular series simple. Dorsal VIII (VIII–IX), 16 (16–17); anal 11 (10–11); pectorals 17 (16–18). Sides of body with 2 bands of ctenoid scales; the dorsal band extends from level of fifth or sixth dorsal spine to near base of upper caudal rays and contains 26 (23–28) scales; the band along lateral line extends to caudal base and contains 36 (34–37) scales.

Body slightly depressed anteriorly, slightly compressed posteriorly; distance from origin of first dorsal to pelvic base 2.1 (2.0–2.1) in head; width at upper end of pectoral base 2.0 (1.9–2.0) in head. Least depth of caudal peduncle 2.3 (2.2–2.4) in orbit.

Head 2.9 (2.8–2.9) in standard length; snout short, 2.0 (1.9–2.1) in orbit, forming an angle of 133° (129°–139°) with frontoparietal region, of 67° (60°–72°) with chin. Maxillary extending slightly beyond middle of pupil. Eye large, diameter of orbit 2.6 (2.5–2.6) in head. Interorbital width about equal to width of suborbitals. Upper preopercular spine with a simple or bifid tip and 3 or 4 recurved barbs along its upper margin. The variation in the tip of the spine, together with the well-known facts of spine development in other genera, leaves no doubt that the number of barbs is a function of age. The three lower preopercular spines are all simple except in one specimen, where the middle one is narrowly bifid on both sides. Pores of head large, 3 prominent ones along dorsal border of suborbitals between anterior margin of orbit and base of suborbital stay; pores of mandibular series simple, without circlet of supernumerary openings.

[2] From διστοιχος, two-rowed.





A, *Silengis distoechus*, new species; *B*, *Astrocottus leprops*, new genus and species.

Base of first dorsal 2.3 (2.0–2.5) in head; fin of 8 (8–9) spines; first spine 1.5 (1.3–1.7) in fourth or fifth spine, which is longest, being 2.6 (2.3–3.0) in head. Base of second dorsal 1.1 (1.0–1.1) in head; fin of 16 (16–17) rays; first ray 1.9 (1.5–2.3) in sixth ray, which is longest, being 2.0 (1.9–2.1) in head. Anal origin under second or third dorsal ray, its posterior end under fourth ray from end of second dorsal; base of fin 1.5 (1.4–1.6) in head; fin of 11 (10–12) rays; first ray 1.8 (1.6–1.9) in sixth or seventh ray, which is longest, being 2.8 (2.6–2.9) in head. Pectoral base 3.1 (3.0–3.3) in head; fin of 17 (16–18) rays; longest ray 1.4 (1.4–1.5) in head. Pelvics extending to or slightly beyond anus, their length 1.7 (1.7–1.9) in head. Caudal with 8 (8–9) split rays; length of fin 1.4 (1.3–1.4) in head.

A single series of 26 (23–28) large scales forming a band along base of dorsal fins, having its origin under fifth or sixth dorsal spine and extending on the dorsal surface of the caudal peduncle to or almost to base of upper caudal rays. Each of these scales in the form of a roughly oval, deeply embedded plate from which rises another smaller strongly ctenoid plate inclined posteriorly. Lateral line armed with 36 (34–37) deeply embedded scales in the form of short tubes, their free posterior margins strongly ctenoid.

TABLE 1.—*Measurements of* Stlengis distoechus

Measurement	Percent of standard length
Origin of first dorsal to pelvic base	17. 2 (16. 7–17. 5)
Origin of second dorsal to anal origin	13. 6 (13. 1–14. 6)
Least depth of caudal peduncle	5. 8 (5. 5– 6. 0)
Distance between dorsal ends of pectorals	18. 0 (17. 6–18. 3)
Head (snout to tip of subopercular flap)	35. 2 (34. 6–36. 3)
Diameter of orbit	13. 6 (13. 1–14. 2)
Snout (tip of premaxillaries to edge of orbit)	6. 7 (6. 3– 7. 2)
Maxillary (from median line just above upper lip)	13. 4 (12. 9–14. 0)
Snout to origin of first dorsal	31. 7 (30. 4–32. 6)
Base of first dorsal (from first to last spine)	15. 3 (13. 8–17. 2)
Snout to origin of second dorsal	50. 5 (49. 8–51. 5)
Base of second dorsal	33. 5 (32. 7–34. 3)
Snout to anal origin	52. 5 (51. 1–53. 8)
Base of anal	24. 2 (22. 0–25. 8)
Snout to dorsal end of pectoral base	34. 6 (33. 5–35. 5)
Snout to ventral end of pectoral base	26. 6 (26. 0–27. 4)
Width of pectoral base	11. 3 (11. 1–11. 8)
Length of pectoral (longest ray)	24. 4 (23. 8–25. 6)
Snout to pelvic base	26. 9 (26. 6–27. 5)
Length of pelvics	20. 4 (19. 0–21. 6)
Length of caudal	25. 4 (24. 8–27. 0)
Snout to anus	47. 0 (46. 4–48. 0)

The color of all the specimens has bleached out during their quarter of a century in alcohol to a pale brownish yellow. The dorsal, anal, and pectoral fins show faint indications of darker markings, while the pelvics and lower rays of the pectorals seem to have been silvery white.

Holotype.—U.S.N.M. no. 94728, 52 mm in standard length, 65 mm in total length; from *Albatross* station 4968, off the coast of Wakayama, Japan, lat. 33°24′50″ N., long. 135°38′40″ E., in 253 fathoms.

Paratypes.—U.S.N.M. no. 94729, 3 specimens, 48.5–51.5 mm in standard length; from the same station. Nat. Hist. Mus. Stanford Univ. no. 28727, 1 specimen, 50.5 mm in standard length; from the same station.

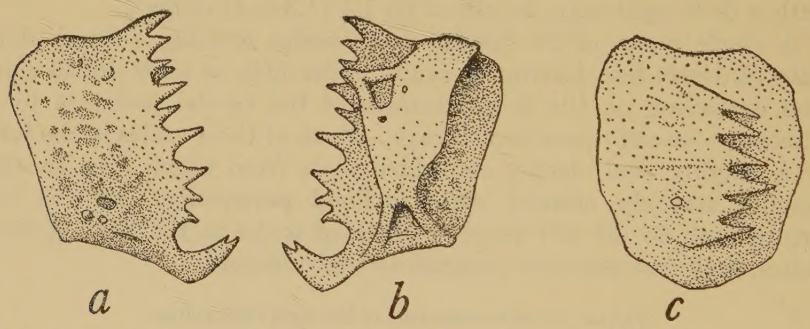


FIGURE 26.—*Stlengis distoechus*, new species: *a*, External, and *b*, internal view of lateral line scale; *c*, scale from dorsal band.

STLENGIS MISAKIA (Jordan and Starks)

Schmidtia misakia JORDAN and STARKS, Proc. U. S. Nat. Mus., vol. 27, p. 237, fig. 2, 1904.

Schmidtina misakia JORDAN and STARKS, Proc. U. S. Nat. Mus., vol. 27, p. 961, 1904; Bull. U. S. Fish Comm., vol. 22, p. 590, fig., 1902 (1904).—JORDAN, TANAKA, and SNYDER, Journ. Coll. Sci. Imp. Univ. Tokyo, vol. 33, p. 255, fig. 190, 1913.

Diagnosis.—Orbit 3.1 (3.0–3.4) in head. Pores of head moderate in size; the main ones of the mandibular series surrounded by a circlet of small supernumerary openings. Dorsal IX (IX–XI), 16 (15–17); Anal 13 (12–14); Pectoral 17 (15–18). Lateral line armed with 36 (36–37) scales, the scale band extending to base of caudal fin. No other scales present.

ASTROCOTTUS,[3] new genus

Genotype.—*Astrocottus leprops*, new species.

Diagnosis.—Preopercle armed with 3 short simple spines. Gill membranes broadly united, free from isthmus. Branchiostegals 6. Teeth in broad villiform bands on premaxillaries, dentaries, and

[3] From ἄστρον, constellation + *Cottus*.

vomer; none on palatines. No slit behind last gill. Gill rakers in form of short tubercles. Anal fin longer than second dorsal; pelvics I, 3. Head and body almost completely covered with strongly ctenoid scales.

This monotypic genus appears to be quite isolated. In some respects it resembles *Ricuzenius* Jordan and Starks, in others *Stelgistrum* Jordan and Starks; but in each case the relationship is remote.

ASTROCOTTUS LEPROPS,[4] new species

FIGURE 27; PLATE 34, B

Diagnosis.—Body depressed throughout, deepest at base of pelvics, the distance from origin of first dorsal to pelvic base 1.9 in head, width at dorsal end of pectoral base 1.6 in head. Ventral body contour practically straight, dorsal contour forming an even gently convex

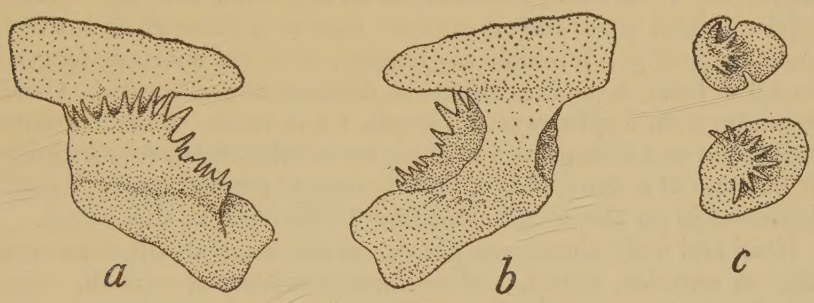


FIGURE 27.—*Astrocottus leprops*, new genus, new species: *a*, External, and *b*, internal view of lateral line scale; *c*, scales from dorsal part of body.

curve from deepest point to very slender caudal peduncle, the least depth of which is 2.7 in orbit.

Head 3.3 in standard length; snout 1.2 in orbit, moderately steep, forming an angle of about 65° with chin. Lower jaw slightly shorter than upper, barely included; maxillary reaching slightly beyond anterior margin of pupil. Anterior and posterior nostrils both in short heavy tubes about equal in length to nasal spines. Size of eye moderate, diameter of orbit 3.2 in head. Suborbital width moderate, 3.0 in orbit. Interorbital space flat, narrow, about 2.0 in posterior width of maxillary. Top of head gently concave. Nasal spines small, their length equal to 0.5 interorbital space. Three simple preopercular spines, all very short; the upper one slightly curved upward; the middle one broad and triangular; the lower one a simple obtuse expansion of the preopercular border. No other spines on head. Pores of head inconspicuous; those of suborbital series in a fairly definite row along the ventral margin, with small supernumerary pores just above; a wide band of numerous small pores on preopercle

[4] From λεπρός, scaly + ὤψ, face.

with a large pore on the margin below each spine; mandibular series made up of groups of small irregularly placed pores; the anterior one on the median line of the symphysis large, simple, and unpaired.

Origin of first dorsal very slightly behind a perpendicular from the posterior end of subopercle ("opercular flap"); base of fin 1.6 in head; fin of 10 spines, the first two with approximate bases; first spine 1.8 in fourth spine, which is longest, being 2.2 in head.[5] Second dorsal separated from first by an interspace about equal to diameter of pupil; its posterior end over base of third ray from end of anal; base of fin 3.0 in standard length; fin of 15 rays; first ray 1.2 in fifth ray, which is longest, being 2.2 in head. Origin of anal about under origin of second dorsal, base of fin 2.7 in standard length; fin of 17 rays; first ray 1.2 in middle rays, the fourth to thirteenth rays subequal and longest, being 2.9 in head. Pectoral base 2.7 in head; fin of 20 rays; longest ray 1.1 in head, extending to level of third anal ray. Base of pelvics behind lower end of pectoral base at a distance about equal to diameter of pupil; middle ray longest, outer ray shortest; length of fin 2.6 in head, extending about 0.5 distance to anal origin. Caudal truncate; with 9 split rays; its length 1.4 in head. Anus in front of anal origin at a distance 1.5 in diameter of orbit; located just anterior to the base of a short, heavy, bluntly conical genital papilla, which is depressed in an abrupt pit extending 0.5 distance to anal origin.

Head and body almost completely scaled; many small scales occurring on anterior, dorsal, and posterior portions of eyeball. Small naked areas surround the anterior nostrils, others occur between nasal spines and posterior nostrils. Lips, chin, lower half of suborbitals, interopercle, lower portion of preopercle and subopercle, and branchiostegal membranes naked. A narrow naked strip surrounds the dorsal fins and extends along the dorsal surface of the caudal peduncle. A similar naked strip occurs ventrally, extending from just anterior to pelvic base to base of caudal fin. The portion of the body below the lateral line, which is covered by the pectoral fins, is naked; this area is separated from the ventral one by a narrow band of scales. The general body scales are in the form of more or less oval, deeply embedded plates from which arise V-shaped or semicircular ctenoid ridges inclined posteriorly. The scales above the lateral line are very irregular in size and position. Below the lateral line the arrangement is more regular, with a tendency toward imbricated rows, larger scales occurring near the lateral line, smaller ones ventrally. Lateral line armed with 34 large scales, each in the form of a short tube with large dorsal and ventroposterior expansions, the outer arch of the tube with a strongly ctenoid dorsal ridge and posterior margin. A long

[5] Additional specimens of this species, recently discovered in the unworked collections of Stanford University, show that the first two dorsal spines are entirely detached from the rest of the fin. Both the artist and I had mistaken the lack of membrane between the second and third spines of the type specimen for a tear in the fin. The membrane between these spines is, however, normally absent, and the figure errs in this respect.

slender cirrus, its length about equal to diameter of pupil, at upper posterior margin of each orbit; a pair of similar cirri on top of head in line with the supraorbital cirri and just anterior to dorsal end of gill opening.

TABLE 2.—*Measurements of the holotype of* Astrocottus leprops

Measurement	Mm
Standard length	48. 0
Total length	58. 4
Origin of first dorsal to pelvic base	7. 7
Origin of second dorsal to anal origin	6. 4
Least depth of caudal peduncle	1. 9
Distance between dorsal ends of pectoral bases	9. 0
Head	14. 6
Diameter of orbit	4. 6
Snout	4. 0
Maxillary	5. 2
Snout to origin of first dorsal	14. 8
Base of first dorsal	9. 4
Snout to origin of second dorsal	25. 5
Base of second dorsal	16. 5
Snout to anal origin	24. 5
Base of anal	17. 9
Snout to dorsal end of pectoral base	13. 9
Snout to ventral end of pectoral base	9. 9
Width of pectoral base	5. 5
Length of pectoral	13. 5
Snout to pelvic base	13. 0
Length of pelvics	5. 7
Length of caudal	10. 4
Snout to anus	21. 0

General body color in alcohol, brownish yellow. A broad reddish-brown bar extends downward and backward from eye. A patch of similar color on top of head, traversed by a narrow whitish cross band, which gives off a short median extension anteriorly. Back crossed by 4 wide reddish-brown cross bars; the first one, under the posterior half of first dorsal, extending downward and forward toward axilla; the second one, under middle of second dorsal, bordered dorsally by whitish anteriorly and posteriorly, extending to halfway between lateral line and anal; third bar, under posterior part of second dorsal, interrupted at lateral line, extending to near anal; fourth bar covering posterior half of caudal peduncle. There is a slight indication of an additional bar under the anterior end of first dorsal; only its posterior margin can be made out, the bar fading

into the general ground color anteriorly. Belly silvery. Dorsals and caudal faintly barred with pale, reddish brown. A brownish patch on base of upper pectoral rays, which are coarsely barred with pale brown, a silvery spot on base of middle rays, and streaks of white on lower rays. Pelvics and anal colorless.

Holotype.—U.S.N.M. no. 94730; from *Albatross* station 4808, Tsugaru Strait, Japan, lat. 41°35′50″ N., long. 140°36′45″ E., in 47 fathoms. This is the only specimen known.

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